

Appl. No. 10/805,179
Amdt. dated November 3, 2005
Reply to Office Action of August 9, 2005

Atty. Ref. 81754.0117
Customer No. 26021

Amendments to the Drawings

The attached sheet of drawings includes changes to Figure 6. This sheet, which includes Figure 5, replaces the original sheet including Figures 5 and 6. In Figure 6, the legend --Prior Art-- has been added.

Attachments: Replacement Sheet (1)
 Annotated Sheet Showing Changes (1)

Remarks/Arguments

Reconsideration of this application is requested.

Drawings

Figure 6 is objected to under MPEP 608.02(g) as lacking the legend --Prior Art--. In response, Figure 6 is amended to include the legend --Prior Art--. A replacement drawing sheet and an annotated sheet showing changes are attached.

Figures 1-5 are objected to under 37 CFR 1.83(a) as not showing every feature of the invention specified in the claims. In particular, claim 11 recites that the *radius* of the globular particle is practically equal to a thickness of the insulating spacer whereas, Figures 1-5 show that the *diameter* of the globular particle is practically equal to a thickness of the insulating spacer.

In response, the term “radius” in claim 11 is changed to “diameter”. Thus, the drawings now show all features of the claims and the objection should be withdrawn.

The drawings are objected to under 37 CFR 1.84(p)(4) because reference characters 44a and 46a have both been used to designate the mirror chip. In response, applicant notes that in Figure 6, reference character 44a properly designates the lower semiconductor chip while reference character 46a designates the mirror chip. However, in one location in paragraph [0003] of the specification, mirror chip 46a is mistakenly referred to as semiconductor chip 44a. Paragraph [0003] is amended to correct this error, thereby overcoming the objections to the drawings.

The drawings are further objected to under 37 CFR 1.84(p)(4) because reference characters 44b has been used to designate both an electronic pad and a semiconductor chip. In response, applicant notes that in Figure 6, reference character 44b properly designates only the electronic pad. However, in one location in paragraph [0004] of the specification, semiconductor chip 45a is improperly designated as “44b”. Paragraph [0004] is amended to correct this error, thereby overcoming the objections to the drawings.

Specification

The title is objected to as not descriptive. In response, the title is amended to "Stacked Semiconductor Device having an Insulating Layer with Variable Thickness", which is clearly indicative of the invention to which the claims are directed.

The specification is objected to under 37 CFR 1.75(d)(1) and MPEP 608.01(o) as failing to provide proper antecedent basis for the claimed subject matter. In particular, the Action notes that claim 12 recites that the *weight* of the globular particles is within 1% through 10% of the weight of the insulating spacer, whereas paragraph [0052] of the specification describes that the *height* of the globular particles is within 1% through 10% of the height of the insulating spacer.

To overcome this objection, "weight" is changed to "height" in claim 12 in order to be consistent with the description in the specification.

Claim Status

Claims 1-20 are pending. Claims 7-8 and 14-16, which are withdrawn from consideration as a result of the previous restriction requirement and election, are canceled without prejudice.

Allowable Subject Matter

The indication of allowable subject matter in claim 11 is noted and appreciated.

Claim Rejections – 35 USC 112

Claim 9 is rejected under 35 USC 112, second paragraph, as indefinite. In particular, the Action asserts to the relative term "better". In response, the term "better" is changed to "greater".

Claim Rejections – 35 USC 102 and 103

Claims 1, 2, 6, 9, 10, 13 and 20 are rejected under 35 USC 102(b) as anticipated by LoBianco (US 6,340,846). Claims 5, 12 and 17 are rejected under 35 USC 103(a) as obvious over LoBianco in view of Fukui (US 6,657,290). Claims 3, 4,

18 and 19 are rejected as obvious over Fukui in view of LoBianco. In response, independent claims 1-4 and 13 are amended to include features that are not shown by either LoBianco or Fukui.

In FIG. 7, LoBianco discloses a package 10 having insulating substrate layer 20 with wire bonding area 26 to connect conductive wire 38. First die 14 is mounted face-up above substrate layer 20 and electrically connected to wire binding area 26 formed on substrate layer 20 by conductive wire 38. Second die 16 is mounted above first die 14 via an adhesive layer 42. Microspheres 48 contained in adhesive layer 42 keep a distance between first die 14 and second die 16 and *all* have a diameter equal to the thickness of adhesive layer 42. See LoBianco, FIG. 7 and Col. 6, lines 7-17.

In FIG. 4, Fukui discloses a semiconductor device having substrate 7 with a plurality of terminals. First semiconductor chip 2 is mounted face-up above substrate 7. A first electrode pad is formed on first semiconductor chip 2. First bonding wire 4 electrically connects the first electrode pad and the terminal formed on substrate 7. Second semiconductor chip 1 is mounted above first semiconductor chip 2. A second electrode pad is formed on second semiconductor chip 1. Second bonding wire 3 connects the second electrode pad and the terminal formed on substrate 7. Insulating resin 6 is formed between first semiconductor chip 2 and second semiconductor chip 1 in such a way as wrapping first bonding wire 4 above first semiconductor chip 2. Molding resin 15 molds first semiconductor chip 2 to which first bonding wire 4 is connected and second semiconductor chip 1 to which the second bonding wire 3 is connected. Fukui does not disclose a solid material or particle contained in the insulating resin, however, the Action asserts that this is obvious in view of LoBianco's teachings of microspheres 48 in adhesive layer 42.

In contrast to LoBianco, however, the present application discloses globular particles 7 in insulating spacer 6 that comprise *various sizes*, wherein at least some of particles 7 have a diameter equal to the thickness of insulating spacer 6 (FIG. 1). Page 13, paragraph [0044], states that the radius of particles 7 in insulating spacer

6 can be set in a range from 30 to 150 μm . Page 14, paragraph [0048] states that at least three of the particles 7 have a size practically equal to the thickness of insulating spacer 6. Page 15, paragraph [0050], states that the height of particle 7 is within a range of 1-10% of the height of insulating spacer 6.

Independent claims 1-4 and 13 are amended to emphasize these features. In particular, independent claims 1-4 and 13 now recite "solid particles contained in the insulating spacer of *different sizes*, wherein one or more of the particles are sized to keep a distance between the first semiconductor chip and the second semiconductor chip". Since neither LoBianco nor Fukui disclose or suggest this feature, they cannot anticipate or render obvious claims 1-4 and 13, or any claims dependent thereon. The rejections under 35 USC 102 and 103 should be withdrawn.

New Claims

New claims 21-23 are added to claim the sizes of the solid particles in more detail.

Conclusion

This application is now believed to be in condition for allowance. The Examiner is invited to telephone the undersigned to resolve any issues that remain after entry of this amendment. Any fees due with this response may be charged to our Deposit Account No. 50-1314.

Respectfully submitted,

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FIG.5

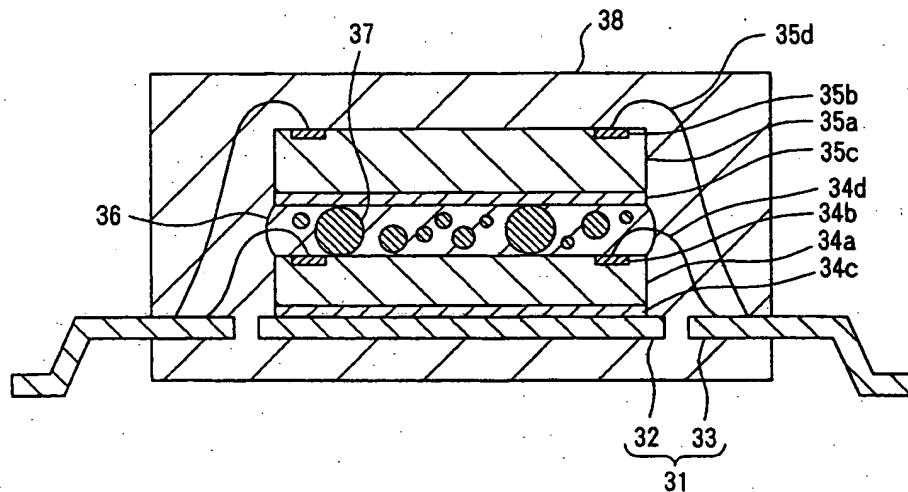
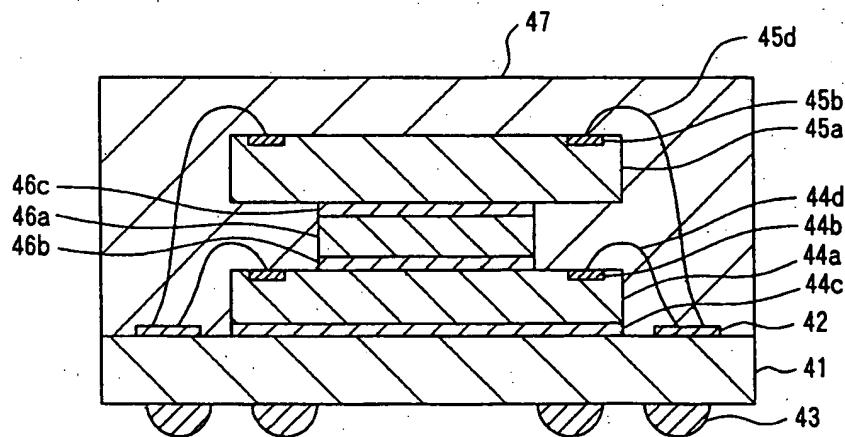


FIG.6



"PRIOR ART"